Prescribed burning for invasive weed management:

The Bear Creek Burn

Caltrans Office of State Landscape Architecture (OSLA) coordinated a prescribed burn June 28, 2000 on approximately five right-of-way acres at the Bear Creek Botanical Management Area (COL 20 PMs 2.0 - 3.28).

The burn was conducted with surgical precision by the Dept. of Forestry and Fire Protection (CDF) under the direction of Battalion Chief Scott Kuhn without incident, injury or risk to public safety. Caltrans District 3 Maintenance, under the supervision of Tom Golden, provided traffic controls and safe passage of vehicles through the burn area and coordinated radio communication among agencies. Post burn observations indicate that the weed management objectives of the event were met fully.

Yellow starthistle is seen here dominating the landscape before the burn.

This prescribed burn was one of an unknown - but believed very small - number of controlled burns that have been performed on Caltrans' rights-of-way in recent years for managing invasive weed species.

See **Fire Management**, Page 2

Did it work?

Preliminary observations of the prescribed burn, June 28th, 2000 Caltrans Bear Creek (COL 20) botanical management area and its effect on three target species of invasive weeds.

by Craig Thomsen
Range Ecologist UC Davis

I monitored the results of the burn on July 1 and July 12, 2000, and *yellow starthistle* was dealt a fatal blow, resulting in over 95% mortality. A few patches did not burn because there was insufficient dry matter to carry the fire or they had been sprayed with water to keep the flame intensity down. Although many plants were not consumed by the fire, they were scorched enough to shut down their growth and prevent seed production. In sections that contained relatively higher levels of flammable material the burn was hotter and few traces of yellow starthistle remained.

It should be noted that sections of the management area that we mowed several weeks prior to the burn increased the dry fuel load in those areas.

See **Observations**, page 2

Fire Management, Cont'd from Page 1

The Bear Creek botanical area is habitat for more than 100 species of native California

plant life and is characterized as a microcosm of Bear Valley, one of the last remaining examples of Upland Wildflower Field in California.

The site divides the roadway from a grazed rangeland area and has remained relatively unaffected by human activity for many years, which makes the site particularly interesting. Native grasses are abundant, as are numerous wildflower species, some of which were extirpated from the adjacent lands by agricultural activity.

The Bear Creek site was surveyed in the spring season, 1998. At that time yellow starthistle (YST) had invaded about one-third of the site. Other invasive species, particularly barb goatgrass and medusahead, infested other portions. Within two years YST dominated more than half the site in dense monocultural stands in which no other plant species appeared to exist.

Integrated efforts to eliminate invasive species - without adverse impact to native vegetation - were initiated in 1999. Weed management activities were conducted through an interagency agreement with UC Davis under the guidance of Range Ecologist Craig Thomsen,

See **Fire Management**, Page 3

Observations, Cont'd from Page 1

If we had not mowed standing plants, sections that were completely dominated by yellow starthistle may not have carried the fire because the starthistle plants were still green at the time of the burn.

Our burn objective was to prevent as much seed production as possible. After the burn, I eliminated surviving yellow starthistle plants with a steel-bladed weed eater. These survivors were adjacent Highway 20 and in several patches within the management area. In addition, I sprayed the fenceline with roundup to reduce seed dispersal from the adjacent unburned U.S. Bureau of Land Management property.

Barb goatgrass, a rapidly-spreading noxious weed in grasslands and serpentine soils, infested at least 50% of the botanical management area. Regarding this year's seed production, It appears to have experienced a similar fate as yellow starthistle. Although there were

many spikelets on the soil surface, most were charred and probably contain few, if any, viable seed. I conducted a preliminary germination

See **Observations**, page 3

Fire Management, Cont'd from Page 2

program manager of the 65,000 acre Bear Creek Watershed Restoration Program.

Scorched skeletons of yellow starthisle as they appeared immediately after the burn

Initial weed control efforts involved time and location-specific mowing, string trimmer treatments, and hand-pulling of weeds. The results were dramatic. In the spring season 2000, carpets of wildflowers and native grasses blanketed areas previously occupied by YST. More than 20 Adobe Lily plants, unnoticed during the 1998 survey, emerged and flowered.

Evidence of the first year effort's success was obscured when the anticipated residual seed bank of YST, barb goatgrass and medusahead quickly responded to favorable conditions. Mechanical controls were performed again during late spring and a plan was developed to implement the burn during the third week in June - timed to coincide with early YST flowering.

The principal considerations in affecting the prescribed burn were safety to personnel involved in the burn, traveler safety, and protection of adjacent lands from escaped fire.

CDF provided three engine companies as well as an incident commander and additional

See **Fire Management**, Page 4

Observations, Cont'd from Page 2

test and did not observe any germinating seeds.

The only patch of *medusahead* in the burn area was destroyed, eliminating all of the seed on the heads and probably any that may have fallen on the soil surface prior to the burn.

These results are encouraging and will be helpful in longer-term management efforts to reduce these noxious weeds and enhance native vegetation at the site.

Even if we assume 100% kill, i.e., no seed production for this year, I anticipate much more work will be needed to deplete the seed bank.

For example, it is known that at least four years of 100% control is required to deplete YST seed banks. I do expect much lower densities of yellow starthistle and barb goatgrass next year (2001) where we now have two consecutive years of weed management. The seed

bank will still produce an ample number of plants to reinfest the site to pre-control densities if we reduce our efforts.

- Craig Thomsen

Fire Management, Cont'd from Page 3

supervisory staff. Each engine company carried a complement of at least three firefighters and sufficient resources (water, etc.) to contain any escaped fire. CDF's aerial fire fighting resources were on alert and available as needed.

CDF with assistance from OSLA, District 3 and the Colusa County Air Pollution Control District wrote the "burn prescription," that specified three major criteria:

- Temperature - must not exceed 90º
- Humidity - must not fall below 20% and,
- Wind speed - must not exceed 12 mph.

The fire would not be ignited - or, if in progress, extinguished - if any of those criteria were exceeded.

The weather forecast for the day projected that afternoon temperatures would exceed 100º. At time of ignition, 8 a.m., air temperature was 74º, humidity 69%, and winds, calm. Site weather conditions were monitored every half-hour.

By 10:30 a.m. air temperature reached 93º, wind speed 5 mph, and humidity 44%. The fire was extinguished a few minutes later with 100% of the primary target area fully burned. Plans to continue the burn on privately owned property adjacent Caltrans right-of-way were withdrawn due to weather conditions that exceeded prescribed limits.

A notable safety observation that must be considered by Caltrans in planning future prescribed fires on state highway rights-of-way is that: a semi-tractor trailer rig traveling adjacent the burn area at 25 mph will cause vortex wind disturbances on the roadside sufficient to change radically the behavior of the fire. The result may be spiral plumes of fire with high flame length that can carry airborne burning debris far beyond the prescribed burn. Consequently, OSLA recommends that traffic speed during prescribed burning operations be managed at less than 25 mph.

OSLA concludes from evaluation of the prescribed fire process, its planning and execution, and the preliminary biological observations of this event that prescribed fire, as conducted at Bear Creek by CDF, can be an effective vegetation management tool for Caltrans.

However, the use of prescribed fire alone will result rarely in complete eradication of undesirable weed species, and should be implemented as one of the tools available in an overall, integrated strategy that incorporates multiple management techniques over time.

George Hartwell
Wildflower/Native Vegetation Coordinator
California Department of Transportation
Office of State Landscape Architecture